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Predicting body weight through morphometric measurement of Kenguri sheep

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Abstract

The present work was carried out to predict body weight from various body measurements in Kenguri sheep. Total of 150 animals with different age groups (0-6 months, 6-12 months and more than 12 months) and different sexes were taken for the present study in Veterinary college Bidar, KVAFSU, Karnataka and nearby villages of Bidar District. The measurements taken were body weight (BW), found to be significant at 6-12 month (Male 27.57 ± 0.75 kg and in female 20.05 ± 0.78 kg) and 12 and above (Male 46.20 ± 0.46 kg and female 32.04 ± 0.55 kg), body length (BL) was significant at 12 and above (male 22.21 ± 0.30 cm and female 20.91 ± 0.13 cm), heart girth (HG) was significant at 6-12 month (male 31.71 ± 0.80 cm and female 28.11 ± 1.90 cm), paunch girth (PG) found significant at the age 6-12 months (male 33.29 ± 0.60 cm and female 29.56 ± 1.80 cm) and above 12 months (male 36.44 ± 0.37 cm and female 35.24 ± 0.31 cm) and height, at withers (HW) found significant at age 6-12 months (male 31.43 ± 0.29 cm and female 26.78 ± 1.23 cm) and above 12 months (male 32.52 ± 0.21 cm and female 30.05 ± 0.21 cm). The prediction equation derived in the present study will be useful to get close values of body weight using body measurements in field conditions in case there is no weighing scale.

Keywords: Prediction equation, body measurements, body weight, Kenguri sheep

1. Introduction

India is a rich source of diverse ovine population with 74.26 million and about 13.8% of the total livestock population is contributed by sheep and it contributes 8 % towards national economy by meat, processed products and their byproducts. Karnataka has 7 million sheep, Tumkur district has highest population of sheep with 10.68 lakh while Udupi district has the lowest number of sheep. In India, sheep are seen mainly in arid and semiarid agro-climatic zones. Maximum sheep population is seen in Andhra Pradesh, Karnataka and Tamil Nadu. There are 60 breeds of sheep, lesser known and some wild species and 44 recognized breeds of sheep in our country. A few breeds also exist in higher altitudes like Jammu and Kashmir and produce fine carpet wool of apparel quality. In general sheep rearing is very less in the areas of high rainfall, deep forest, water logging and Malnad area. The breeding of sheep is the backbone of the small and marginal farmers' economies. The state has sizable capacity for shared resources and pastures and pastureland is widespread. Kenguri breed is found in the district of Koppal, Raichur and the neighbouring district of Bagalkot and the district of Gulbarga. In both India and Karnataka, the majority of sheep breeds show low production and low growth. The sheep are large in size, body coat is dark brown or coconut coloured. In most cases, there is a white spot on the forehead and sometimes on legs and other body parts also. Some of the Kenguri sheep have black belly and are known as "JODKA". Ears are medium long and drooping. Males are usually horned and females polled. About 85% males and 6% females were observed as horned. Average horn length was 33.6 ± 0.97 cm in males and 10.2 ± 0.52 cm in females. Tail was short and thin with an average length of 10.1 ± 0.08 cm. The present study is under taken on the Kenguri breed of sheep record the different body parameters.

2. Materials and Methods

The body measurements of individual animals of different sexes (Male and Female) and age groups (0-6 months, 6-12 months and more than 12 months) were taken using a standard metallic and nylon tape. The live weight of the animal was taken using electronic Salter spring balance of 150 kg. In this study, the following body measurements were taken into consideration i.e. live body weight, Body length, Heart girth, Paunch girth, Height at withers.

The data for the present study was obtained in Kenguri sheep farm in Veterinary College Bidar Karnataka state and nearby villages of Bidar district. The data were recorded on total of 150 animals and were divided in different age groups of 0-6 months, 6-12 months and more than 12 months and Male and Female. The basic instruments used for the present study were measuring tape, measuring scale and weighing machine. All body measurements were recorded in centimeters and live body weight was recorded in kilograms. The data collected was analysed by using Microsoft Excel 2007 software and statistical analysis was done using SPSS software version 25 (2010) using General Linear Model (GLM) procedure. Stepwise multiple regression analysis was used by including body length, heart girth, paunch girth and height at withers measurements individually and collectively to identify the best predictive variable for predicting the body weight.

$$Y = a + b_1x_1 + b_2x_2 + \dots + b_nx_n$$

Y=Dependent variable (Bodyweight)
 a= Intercept value
 b=Slope
 x=Independent variable (BL, HG, PG, HW)

3. Results and Discussions

To predict body weight from various body measurements, multiple regression analysis has been used and R² values have been determined for each regression equation to indicate the degree of accuracy of prediction of body weight. It was found that body measurements as independent variable could give R² value of age group 0 to 6 months as 0.784, for 6 to 12 months as 0.590 and for above 12 months as 0.548. The multiple regression analysis of body measurements on body weight in age group 0 to 6 months, 6 to 12 months and above 12 months are given in Table 1. The best prediction equations and coefficient of determination (R²) values for estimation of body weight for different age group and sex were found to be:

Equations

0-6 months

$$Y = -16.78 + 0.76 (BL) + (-1.53) (HG) + 0.96 (PG) + 0.99 (HW)$$

6-12 months

$$Y = -8.24 + 2.04 (BL) + 0.70 (HG) + (-3.3) (PG) + 2.61 (HW)$$

Above 12 months

$$Y = -42.72 + 1.18 (BL) + (-1.25) (HG) + 1.34 (PG) + 0.94 (HW)$$

Table 1: Multiple Regression Analyses of body measurements on body weight in different age groups

Sl. No.	Age group	Male	Female	p-value
1	0-6months	12.27±1.09	9.40±0.96	0.064
2	6-12months	27.57±0.75	20.05±0.78	0.00
3	Above 12 months	46.20±0.46	32.04±0.55	0.00

Non-significant (p>0.05)**; significant (p<0.05)*5% difference

The prediction of body weight based on body measurements had higher coefficient of determination (R²) which was found to be similar to the findings of Thiruvankadan, (2005) [1], Raja et al. (2015) [2], Berhe (2017) [3] and Habib et al. (2019) [4].

4. Conclusion

Body morphometric measurements of Kenguri sheep in male

& female at different ages shows that male is having high body measurement when compared to female. Multiple regression analysis was carried out and mean and range of all the parameters were calculated to predict the equation for the prediction of body weight. Body weight was predicted using prediction equation and it was found that, the bodyweight of sheep at 0-6 month, 6-12 month and above 12 month was 10.42 kg, 26.78kg and 30.05 kg respectively which is closely related with actual body weight of sheep which was 10.83 kg, 22.81 kg and 39.12 kg at different ages. Correlation coefficient between body weight and BCS at age group 0-6 month in females was significant (p<0.05) whereas nonsignificant in male (p>0.05). In 6-12 months, in females it was found to be significant (p<0.05) where as non significant in male (p>0.05). In above 12 months, it was found to be significant in both male and female (p<0.05). It could be concluded that, in the field conditions and in the absence of specified instruments, the prediction model for body weight of adult Kenguri sheep can be used to estimate the body weight with fair accuracy.

6. References

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